7.4 Computing Probability Extra Practice Name Key

1. Consider the composition of a three-child family. Assume that a girl is as likely as a boy at each birth. (It may be helpful to list the sample space and use it to answer each question.)

BBB
BGB
BGG
BBG
GGG
GBG
GGB
GBB

A. What is the probability that there are one boy and two girls in the family?

$\frac{3}{8}$

B. What is the probability that the middle child is a boy?

$\frac{1}{2}$

C. What is the probability that the eldest child is a boy and the youngest child a girl?

$\frac{2}{8} = \frac{1}{4}$

2. Two cards are selected at random without replacement from a well-shuffled standard 52-card deck.

A. Find the probability that both cards are red.

$P(2\text{ red}) = \frac{C(26,2)}{C(52,2)} = \frac{325}{1326} = \frac{25}{102}$ or .245

B. Find the probability that at least one of the cards is black.

$1 - P(\text{no black}) = 1 - .245 =$ .755

3. Two cards are selected at random without replacement from a well-shuffled standard 52-card deck.

A. Find the probability that one card is red and one card is black.

$\frac{C(26,1)\cdot C(26,1)}{C(52,2)} = \frac{676}{1326} = \frac{26}{51}$ or .51

B. Find the probability that one card is a red face card and the other card is a black face card.

$\frac{C(6,1)\cdot C(6,1)}{C(52,2)} = \frac{36}{1326} =$ .027

4. Assuming that the probability of a boy being born is the same as the probability of a girl being born, find the probability that a family with four children will have: $n(S) = 2\cdot2\cdot2\cdot2 = 16$

A. two boys.

$\frac{C(4,2)}{16} = \frac{6}{16} =$ .375

B. two boys, one of whom is their eldest child.

BGBG BGGB
BBGG

$\frac{3}{16} =$ .1875

5. An automobile manufacturer has 30 engines in a warehouse. Three of the engines have defective oxygen sensors. If five of the engines are selected at random to be sent to an assembly plant, find the probability that at least one of the engines selected has a defective oxygen sensor. $1 - P(\text{none defective})$

$1 - \frac{C(27,5)}{C(30,5)} = 1 - \frac{80730}{142506} =$ .433

6. A computer retailer has 50 computers in a warehouse. Four of the computers have defective hard drives. If eight of the computers are selected at random to be sent to customers, find the probability no more than 2 of these computers have defective hard drives. $P(0, 1, \text{or } 2 \text{ defective})$

$\frac{C(46,8)}{C(50,8)} + \frac{C(4,1)\cdot C(46,7)}{C(50,8)} + \frac{C(4,2)\cdot C(46,6)}{C(50,8)} =$ .989